ABSTRACT

A fuel cell structure and method of manufacture is disclosed that enables very low cost fabrication using conventional semiconductor manufacturing facilities. The fuel cell structure permits fabrication of all the salient features on a single planar substrate. Current extractor lines, electrodes, catalyst, proton exchange membrane, fuel and oxidizer channels and manifolds, electrical interconnect between cells, and end caps are all fabricated sequentially through additive and subtractive processing on a single substrate. The structure provides for ion exchange membrane conduction to take place perpendicular to the plane of the cell. The design and manufacturing technique allows for the production of a very small elemental cell with high power density. The monolithic structure provides for the stacking of the elemental cells or entire interconnected substrates by virtue of built-in fuel and oxidizer manifold chambers and electrical interconnect fabricated within each elemental cell.